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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application:	Marler, Mark E.
Serial No.	10/501,659
Filing Date:	07/14/2004
Art Unit:	3654
Examiner:	Pico, Eric E.
For:	ELEVATOR SYSTEM DESIGN INCLUDING A BELT ASSEMBLY WITH A VIBRATION AND NOISE REDUCING GROOVE CONFIGURATION

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
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Dear Sir:

Appellant now submits its brief in this appeal. A credit card payment form is enclosed.

Real Party in Interest

Otis Elevator Company, which is the assignee of this application, is the real party in interest. Otis Elevator Company is a business unit of United Technologies Corporation.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of the Claims

Claims 1, 3-9 and 11-17 are pending and on appeal.

Claims 1, 4-7, 9, 11 and 12 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,364,061 ("the *Baranda, et al.* reference") in view JP Application No. 8-247221 ("the *Yaginuma* reference").

Claims 8, 13 and 14 were rejected under 35 U.S.C. §103 as being unpatentable over the *Baranda, et al.* reference in view of the *Yaginuma* reference and further in view of U.S. Patent No. 4,647,278 ("the *Hull* reference").

Claims 15 and 16 were rejected under 35 U.S.C. §103 as being unpatentable over the *Baranda, et al.* reference in view of the *Hull* reference.

Claim 17 was rejected under 35 U.S.C. §103 as being unpatentable over the *Hull* reference.

Status of Amendments

There are no unentered amendments.

Summary of Claimed Subject Matter

Claim 1 is a method claim as follows:

> 1. A method of designing an elevator system having a belt with a plurality of grooves on one side of the belt that travels over at least a drive sheave, comprising the steps of:
> selecting a diameter of at least the drive sheave; and
> selecting a width of the grooves on the belt such that a ratio of the groove width to the sheave diameter is less than about .015.

An example embodiment from the specification that is consistent with claim 1 is schematically shown in Figures 1-3. An example belt assembly 20 includes a jacket 24 having a plurality of grooves 30 on one side 32. (Page 4, line 17; page 5, line 7) Such a belt is useful in an elevator system 50. The illustrated example elevator system 50 includes a counterweight 52 and cab 54 that move through a hoistway 56 in a conventional manner. A drive sheave 58 driven by a motor mechanism 60 facilitates the desired movement of the cab 54 and counterweight 52 as

needed to transport passengers or cargo between landings within a building, for example. (Page 6, line 18 – page 7, line 5)

The width of the grooves 30 is selected to have a dimensional relationship with at least the diameter of the drive sheave 58. (Page 7, lines 6-7) According to claim 1, that dimensional relationship includes a ratio of the groove width to the sheave diameter that is less than about 0.15. (Page 8, lines 12-14)

Claim 3 includes "selecting the sheave diameter and groove width such that the ratio is less than about .008." The example of Figure 5 includes a plot 80 that shows an amplitude of vibrations relative to the ratio of groove width to sheave diameter. When the ratio is below .008 in the illustrated example, the amount of vibration is effectively the same and is considered acceptable in many situations because that level of vibration does not tend to generate any audible noise within an elevator system. (Page 8, lines 20-24)

Dependent claim 5 includes "selecting the ratio of groove width to sheave diameter based upon an expected speed of elevator cab travel." The speed of movement of the belt assembly within an elevator system is a factor that affects the optimally selected ratio of groove width to sheave diameter. As elevator speed increases, a desired ratio of groove width to sheave diameter decreases. Likewise, as elevator speed decreases, the acceptable range of ratios of groove width to sheave diameter increases. (Page 10, lines 3-10)

Dependent claim 8 includes "providing a fillet at the edges of each groove." In the example illustrated in Figures 1 and 2, the groove configuration includes a rounded edge or fillet 34 at each end of each groove where the groove joins the side 32 of the exterior of the jacket 24. A rounded fillet reduces noise and vibration as each groove contacts the sheave about which the belt wraps during elevator system operation. (Page 5, lines 14-19)

Independent claim 9 recites:

> 9. An elevator system, comprising:
> a cab;
> a belt that supports the cab and facilitates movement of the cab, the belt having a plurality of spaced grooves on at least one side of the belt; and
> at least one sheave over which the belt travels as the cab moves, the sheave having a diameter that has a relationship to a width of the grooves on the belt so that a ratio of the groove width to the sheave diameter is less than about .015.

The portions of the specification referenced when discussing claim 1 are also applicable for a discussion of claim 9. Rather than repeating that text here, Applicant directs the Board's attention to the appropriate portions of the specification mentioned above.

Dependent claim 11 recites that "the ratio is less than about .008." Appropriate portions of the specification were discussed with regard to claim 3 above. Those portions are equally applicable to claim 11.

Dependent claim 13 includes "a fillet at the edges of each groove." The portions of page 5 of the specification referenced above with regard to claim 8 are equally applicable to the consideration of claim 13.

Independent claim 15 recites:

> 15. An elevator belt assembly, comprising:
> a plurality of cords aligned generally parallel to a longitudinal axis of the elevator belt; and
> a jacket over the cords, the jacket including a plurality of grooves spaced longitudinally on at least one side of the jacket, the grooves including a fillet near the one side of the jacket, the plurality of cords, the jacket and the elevator belt each having a first longitudinal end that is separate and distinct from a second, opposite longitudinal end.

Figures 1 and 2 show one example of such an assembly. The illustrated example belt assembly 20 includes a plurality of cords 22 aligned generally parallel to a longitudinal axis of the belt assembly 20. (Page 4, lines 18-19) The example jacket 34 includes a plurality of grooves 30

and establishes an exterior width and thickness of the belt assembly 20. (Page 5, lines 3-4 and 7) As can be appreciated from Figure 3, there are two longitudinal ends of the illustrated example belt assembly 20, each of which is located near a top of the example hoistway 56. In the illustrated example, the groove configuration includes a rounded edge or fillet 34 at each end of each groove 30 where the groove 30 joins the side 32 of the exterior of the jacket. (Page 5, lines 14-16)

Independent claim 17 recites:

> 17. An elevator belt assembly, comprising:
> a plurality of cords aligned generally parallel to a longitudinal axis of the belt; and
> a jacket over the cords, the jacket including a plurality of grooves spaced longitudinally on at least one side of the jacket, the grooves including a fillet near the one side of the jacket wherein each fillet has a radius of curvature that is between about 0.1 mm and about 0.5 mm.

Figures 1 and 2 show one example of such an assembly. The illustrated example belt assembly 20 includes a plurality of cords 22 aligned generally parallel to a longitudinal axis of the belt assembly 20. (Page 4, lines 18-19) The example jacket 34 includes a plurality of grooves 30 and establishes an exterior width and thickness of the belt assembly 20. (Page 5, lines 3-4 and 7) The illustrated example includes a fillet radius of curvature in the range from about 0.1 mm to about 0.5 mm. (Page 6, line 5)

<u>Grounds of Rejection to be Reviewed on Appeal</u>

Claims 1, 4-7, 9, 11 and 12 stand rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,364,061 ("the *Baranda, et al.* reference") in view JP Application No. 8-247221 ("the *Yaginuma* reference").

Claims 8, 13 and 14 stand rejected under 35 U.S.C. §103 as being unpatentable over the *Baranda, et al.* reference in view of the *Yaginuma* reference and further in view of U.S. Patent No. 4,647,278 ("the *Hull* reference").

Claims 15 and 16 stand rejected under 35 U.S.C. §103 as being unpatentable over the

Baranda, et al. reference in view of the *Hull* reference.

Claim 17 stands rejected under 35 U.S.C. §103 as being unpatentable over the *Hull* reference.

ARGUMENT

There is no *prima facie* case of obviousness against any of Applicant's claims. The Examiner's proposed combinations are based upon reasoning that is contrary to the explicit teachings of the references. Therefore, the proposed modifications cannot be made and there is no *prima facie* case of obviousness.

1. The rejection of claims 1, 4-7, 9, 11 and 12 under 35 U.S.C. §103 based upon the proposed combination of the *Baranda, et al.* and *Yaginuma* references must be reversed.

It is important to understand what the *Baranda, et al.* reference actually teaches. That reference discusses two very distinct types of elevator system configurations; one including traditional round steel ropes with relatively large sized sheaves and the other including flat belts with reduced diameter sheaves. The *Baranda, et al.* reference expressly teaches away from using the large sized sheaves (associated with traditional, round steel ropes) when implementing a flat belt as disclosed in the *Baranda, et al.* reference. The Examiner's proposed combination of the *Baranda, et al.* and the *Yaginuma* references goes directly contrary to those express teachings. The Examiner proposes to insert a groove width from the flat belt of the *Yaginuma* reference into a system having a sheave intended for use with a traditional, round steel rope. The *Baranda, et al.* reference, however, expressly teaches against such a combination because it expressly teaches using reduced size diameter sheaves when using a flat belt in place of a round rope.

Overall, a main theme in the *Baranda* reference is reducing sheave diameter from that used with conventional steel ropes (or even aramid fiber ropes) when using a flat belt tension member as disclosed in *Baranda's* specification. The following teachings from the *Baranda, et al.* reference are instructive:

> Another limitation on the use of steel ropes is the flexibility and fatigue characteristics of steel wire ropes. Elevator safety codes today require that each steel rope have a minimum diameter d ... and that the D/d ratio for traction elevators to be greater than or equal to 40 ... where D is the diameter of the sheave. This results in the diameter D for the sheave being at least 320 mm (380 mm for ANSI). The larger the sheave diameter D, the greater torque required from the machine to drive the elevator system. (Col. 1, lines 35-45)
>
> ...
>
> Even though the flexibility characteristic of [ ] synthetic fiber ropes may be used to reduce the required D/d ratio, and thereby the sheave diameter D, the ropes will still be exposed to significant rope pressure. The inverse relationship between sheave diameter D and rope pressure limits the reduction in sheave diameter D that can be attained with conventional ropes formed from aramid fibers. (Col. 2, lines 3-9)
>
> As a result of the configuration of the tension member [disclosed in the *Baranda, et al.* reference], the rope pressure may be distributed more uniformly throughout the tension member. As a result, the maximum rope pressure is significantly reduced as compared to a conventionally roped elevator having a similar load carrying capacity. Furthermore, the effective rope diameter "d" (measured in the bending direction) is reduced for the equivalent load bearing capacity. ***Therefore, smaller values for the sheave diameter "D" may be attained without a reduction in the D/d ratio. In addition, minimizing the diameter D of the sheave permits the use of less costly, more compact, high speed motors as the drive machine without the need for a gear box.*** (Col. 2, lines 41-52, emphasis added)
>
> In a particular embodiment of the present invention ... ***the acceptable traction sheave diameter may be further reduced*** while maintaining the maximum rope pressure within acceptable limits. As stated previously, ***smaller sheave diameters reduce the required torque of the machine driving the sheave and increase the rotational speed. Therefore, smaller and less costly machines may be used to drive the elevator system.*** (Column 2, lines 53-64, emphasis added)

Later in the *Baranda, et al.* reference when discussing the possibility of using a liner 42 on a sheave with *Baranda, et al.'s* flat belt, the reference teaches that it "may prove cost effective if it is

determined that, ***due to the diminished size of the sheave***, it may be less expense to simply replace the entire sheave rather than replacing sheave liners." (Column 6, lines 16-19, emphasis added) In other words, the *Baranda, et al.* reference teaches that significant reductions in sheave size are desired for cost effectiveness when using a flat belt in place of a traditional, round rope.

The Examiner's application of the *Baranda, et al.* reference ignores the express teachings that one is to use a reduced size sheave with a flat belt. Nothing in the *Baranda, et al.* reference in any way contemplates or suggests using a flat belt with the large sized sheaves that are required for round ropes.

Those skilled in the art would not use an unnecessarily large sheave intended for a round rope with a flat belt. *Baranda et al.* and *Yaginuma* teach that.

The *Yaginuma* reference teaches using a very small sheave when using the flat belt of the *Yaginuma* reference. Even being generous, the diameter of the pulley 20 in Figure 1 of the *Yaginuma* reference is not even twice the width of the belt of that reference. The belt of the *Yaginuma* reference is 25 mm wide. The *Yaginuma* reference, therefore, does not show a sheave that is even 50 mm in diameter. Certainly nobody looking at the teachings of that reference would be led to incorporate the belt of the *Baranda, et al.* or *Yaginuma* reference into a system that has a 320 mm sheave.

Neither of the *Yaginuma* or *Baranda, et al.* references teaches using a large sheave with a flat belt. The Examiner effectively proposes to do the opposite of what the references are teaching. Therefore, there is no motivation for making the Examiner's proposed combination and there is no *prima facie* case of obviousness.

The *Baranda* reference teaches that using traditional steel ropes required a minimum rope diameter of 8 mm or 9.5 mm, depending on the safety code. The ratio of a sheave diameter to the

rope diameter had to be greater than or equal to 40. This results in a diameter for the sheave being at least 320 mm or 380 mm, respectively. (Column 1, lines 36-43)

The Examiner cannot combine a 320 mm sheave (as used with traditional round steel ropes) from the *Baranda* reference with a flat belt having the groove width of the *Yaginuma* reference. The *Baranda* reference teaches away from using a large diameter (e.g., 320 mm) sheave in combination with a flat belt. (Column 1, lines 36-43)

The *Baranda* reference teaches away from using such large sized sheaves to reduce costs. "The larger the sheave diameter D, the greater torque required from the machine to drive the elevator system." (Col. 1, lines 41-45)

Baranda's disclosed example flat belts are at least partially intended to minimize the diameter of the sheave as much as possible. "Minimizing the diameter D of the sheave permits the use of less costly, more compact, high speed motors." (Col. 2, lines 50-52) "Smaller sheave diameters reduce the required torque ... and increase the rotational speed. Therefore, smaller and less costly machines may be used to drive the elevator system." (Col. 2, lines 60-64)

No reasonable interpretation of the *Baranda* reference would lead one to use a 320 mm (or larger) diameter sheave with a flat belt. Instead, only a smaller sheave combination with a flat belt would be reasonable from the teachings of the *Baranda* reference on its face. The Examiner is going contrary to the teachings of the *Baranda* reference when making the proposed combination of a 320 mm sheave (used with a traditional round steel rope) from the *Baranda* reference with a flat belt having the groove width of the *Yaginuma* reference. That combination cannot be made because it is directly contrary to the teachings of at least the *Baranda* reference.

Even if the proposed combination could be made, it does not result in the claimed invention. If one takes the sheave diameters actually contemplated for use with flat belts by

Baranda, et al. and adds the groove width from *Yaginuma*, the result is not the same as Applicant's claims.

The *Baranda, et al.* reference teaches at column 7, lines 35-43 that using flat aramid fiber belts provides an 80% reduction in sheave size from the sheave required for the 10 mm SISAL core steel wire ropes or a 60% sheave diameter reduction relative to an 8 mm aramid fiber rope arrangement. These two disclosed sheave diameter reductions translate into a sheave diameter in the 77 to 80 mm range for use with a flat belt.

Considering the reduction relative to 10 mm SISAL core steel wire ropes first, the starting sheave diameter is 400 mm (based on the required ratio between sheave diameter and steel rope diameter (D/d) of 40), which is reduced by 80%. This results in an 80 mm sheave (e.g., 400mm x .2 = 80mm). Using the 1.5mm groove width of Yaginuma yields a ratio of .019 (e.g., 1.5/80 = .019), which is outside of the scope of Applicant's claims. If one were to use the groove width of *Yaginuma* with an 80 mm sheave, that would result in a ratio of groove width to sheave diameter that is outside of the scope of Applicant's claims by more than 25%. Therefore, even if the combination could somehow be made, the result is not the same as the claimed invention and there is no *prima facie* case of obviousness.

Considering the reduction relative to an 8 mm aramid fiber rope arrangement should have the same result, since the permissible sheave diameter is being driven by the same flat aramid rope. The calculations confirm this, resulting in reduced sheave diameter of approximately 77 mm. In this case, the starting point is a 192 mm sheave, which is reduced by 60% (e.g., 192mm x .4 = 76.8mm). It is important to note that the art does not teach using the 320 mm sheave (intended for round steel ropes of 8mm diameter) with the aramid ropes. Instead, everything indicates that the aramid ropes allow for reducing sheave diameter and, therefore, the only

reasonable interpretation is that the sheave diameter used with the 8 mm aramid fiber ropes of the *Baranda* reference was less than 320 mm.

> With the development of high tensile strength, lightweight synthetic fibers has come the suggestion to replace steel wire ropes in elevator systems with ropes having load carrying strands formed from synthetic fibers, such as aramid fibers. Recent publications making this suggestion include: U.S. Pat. No. 4,022,010 issued to Gladdenbeck, et al.; U.S. Pat. No. 4,624,097 issued to Wilcox; U.S. Pat. No. 4,887,422 issued to Klees, et al.; and U.S. Pat. No. 5,566,786 issued to DeAngelis, et al. (Col. 1, lines 46-54)

> Even though the flexibility characteristic of [ ] synthetic fiber ropes may be used to reduce the required D/d ratio, and thereby the sheave diameter D, the ropes will still be exposed to significant rope pressure. The inverse relationship between sheave diameter D and rope pressure limits the reduction in sheave diameter D that can be attained with conventional ropes formed from aramid fibers. (Col. 2, lines 3-9)

The patents cited in column 1 of the *Baranda* reference also indicate that smaller sheave diameters are used with the aramid ropes compared to the sheave diameters used for steel ropes.

U.S. Patent No. 4,624,097, for example, teaches a sheave preferably 24 times larger in diameter than an aramid rope (or the sheave diameter could be 17 times greater). Nothing in the *Baranda* reference teaches anything different regarding the size of a sheave used with an aramid rope. Using the "sheave diameter is 24 times aramid rope diameter" teaching from the '097 patent cited in the *Baranda* reference and combining that with *Yaginuma's* 1.5 mm groove width does not result in Applicant's claimed invention. Using an 8 mm aramid rope and a sheave having a diameter that is 24 times larger (e.g., 192 mm) and then reducing that sheave diameter by 60% results in a 76.8mm sheave. (The fact that this diameter is approximately equal to the 80mm discussed above confirms the validity of this analysis.) Combining that with a 1.5 mm groove width from *Yaginuma* yields a ratio of .02, which is a result that is even farther outside of the scope of Applicant's claims (e.g., 1.5/8 x 24 x 40%=.02).

Therefore, even if one could combine the groove width of the *Yaginuma* reference with the sheave size actually taught by the *Baranda* reference for use with a flat belt, the result would not be Applicant's claimed invention and there is no *prima facie* case of obviousness.

Given that the *Baranda* reference repeatedly teaches reducing sheave diameter as much as possible, it is not a reasonable interpretation of the teachings of that reference to suggest using a 320 mm sheave or a lower reduction than an 80% reduction (e.g., arbitrarily selecting a non-disclosed, different sheave size) when attempting to make a combination with the *Yaginuma* reference. There is absolutely no motivation from either reference for doing that. The only basis for twisting the teachings of the *Baranda* reference in that manner would be hindsight reasoning using Applicant's claims as a template for attempting to piece together the *Baranda* and *Yaginuma* references. That is not permissible under 35 U.S.C. §103 and the proposed combination cannot be made.

Additionally, the Examiner's rejection of claims 5 and 6, which incorporate an expected speed into the selection of sheave diameter and groove width finds no support whatsoever within the references. There is no possible *prima facie* case of obviousness against these two claims even if the Examiner were correct that the *Baranda* reference and the *Yaginuma* reference could be combined as the Examiner proposes. The improper combination in no way suggests the invention of either of claims 5 or 6.

2. **The rejection of claims 8, 13 and 14 under 35 U.S.C. §103 based upon the proposed combination of the *Baranda, Yaginuma* and *Hull* references must be reversed.**

The base combination cannot be made and does not teach what the Examiner contends as already explained above. Further, there is no motivation for adding a fillet from the *Hull* reference to the belt of the *Yaginuma* reference. The Examiner contends that it would be obvious

to add such a fillet to "improve the belt life and reduce the noise during operation." There is no indication that the addition of the end 46 of the *Hull* reference to the *Yaginuma* belt would have anything to do with "improving belt life" so that that conclusion appears to be based purely on the Examiner's speculation or an inference from Applicant's disclosure.

Moreover, there is no motivation for adding an end 46 from the *Hull* reference to the grooves of the *Yaginuma* reference for the purpose of reducing noise. The *Yaginuma* reference places grooves at an oblique angle to essentially eliminate any noise associated with those grooves. This is expressly taught in the *Yaginuma* reference. In paragraph 11, for example, it says, "There is almost no difference in the sound pressure level between sample C with no grooves and sample B of the first application example with linear oblique grooves (13)." Because the groove alignment of the *Yaginuma* reference already eliminates any noise effect of the grooves such that it performs as if it were grooveless, there is no motivation for adding another feature to "reduce noise." *Yaginuma* already addresses that problem and adding another, redundant feature cannot be done in an attempt to manufacture a *prima facie* case of obviousness. Therefore, the proposed combination of the *Baranda, Yaginuma* and *Hull* references cannot be made.

3. **The rejection of claims 15 and 16 based upon the proposed combination of the *Baranda* and *Hull* references must be reversed.**

There is no motivation for making this combination. The *Hull* reference teaches that the grooves 28 are for enhancing the flexibility of the belt construction for use around pulleys of small diameters. (Column 2, line 66 – column 3, line 8) The *Baranda* reference discloses a tension member that already has great flexibility. There is no reason to add grooves to that belt based on the teachings of the *Hull* reference.

Moreover, the *Yaginuma* reference expressly teaches that grooves on a belt introduce undesirable noise. Applicant's background also describes that problem. There is no motivation for adding grooves to the *Baranda* belt because that would add a source of noise that is recognized as undesirable in elevator systems. Therefore, there is no motivation for making the proposed combination of the *Baranda* and *Hull* references and there is no *prima facie* case of obviousness.

4. **The rejection of claim 17 under 35 U.S.C. §103 based upon the *Hull* reference must be reversed.**

It appears that the Examiner is proposing to take a feature of the longitudinal grooves of the *Hull* reference and incorporate them into a transverse groove on the *Hull* reference for the purpose of "increasing the amount of material providing a longer life span." That finds no support within the *Hull* reference and such a modification is not a reasonable extension of the teachings of the *Hull* reference.

The Examiner acknowledges that a radius of curvature of the ends 46A of the transverse grooves 28 in the *Hull* reference is 1.19 mm. The Examiner then tries to take the .004 inch radius of curvature for the longitudinal grooves and substitute that into the transverse grooves of the *Hull* reference. If it were beneficial to do that, the *Hull* reference would have done that. The *Hull* reference expressly teaches different radii of curvature at the edges of the transverse and longitudinal grooves, respectively. If using the longitudinal groove feature on the transverse grooves had any benefit such as "providing longer useful life," the *Hull* reference certainly would have taught that. *Hull*, as the inventor of the groove arrangement in that reference would have recognized that benefit and would have expressly taught it if, in fact, there were any motivation for making the transverse grooves like the longitudinal grooves of that reference.

The Examiner's rejection of claim 17 appears to be based purely on hindsight reasoning and goes directly contrary to the teachings of the *Hull* reference, which are to provide different radii on the differently oriented grooves. There is nothing within the *Hull* reference that suggests the Examiner's modification of that reference. The Examiner's conclusion appears to be based purely on hindsight reasoning and an attempted reconstruction of the teachings of the *Hull* reference to manufacture a *prima facie* case of obviousness against Applicant's claim 17. That type of analysis is not permitted under 35 U.S.C. §103.

CONCLUSION

There is no prima facie case of obviousness against any of Applicant's claims. The Examiner's proposed modifications are contrary to the express teachings of the references and, therefore, cannot be made. All rejections must be reversed.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that the enclosed Appeal Brief is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief – Patents, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on December 15, 2006.

Theresa M. Palmateer

APPENDIX OF CLAIMS

1. A method of designing an elevator system having a belt with a plurality of grooves on one side of the belt that travels over at least a drive sheave, comprising the steps of:

selecting a diameter of at least the drive sheave; and

selecting a width of the grooves on the belt such that a ratio of the groove width to the sheave diameter is less than about .015.

3. The method of claim 1, including selecting the sheave diameter and groove width such that the ratio is less than about .008.

4. The method of claim 1, including selecting the sheave diameter and groove width such that the ratio is between .001 and .015.

5. The method of claim 1, including selecting the ratio of groove width to sheave diameter based upon an expected speed of elevator cab travel.

6. The method of claim 5, including selecting the ratio to be in a first range when the expected speed is a first speed and selecting the ratio to be in a second higher range when the expected speed is a second, slower speed.

7. The method of claim 5, wherein the expected speed is approximately 1 m/s and including selecting the sheave diameter and the groove width such that the ratio is less than about .008.

8. The method of claim 1, including providing a fillet at the edges of each groove.

9. An elevator system, comprising:

a cab;

a belt that supports the cab and facilitates movement of the cab, the belt having a plurality of spaced grooves on at least one side of the belt; and

at least one sheave over which the belt travels as the cab moves, the sheave having a diameter that has a relationship to a width of the grooves on the belt so that a ratio of the groove width to the sheave diameter is less than about .015.

11. The system of claim 9, wherein the ratio is less than about .008.

12. The system of claim 9, wherein the ratio is between .001 and .015.

13. The system of claim 9, including a fillet at the edges of each groove.

14. The system of claim 13, wherein the fillets each have a radius of curvature that is between about 0.1 mm and about 0.5 mm

15. An elevator belt assembly, comprising:

a plurality of cords aligned generally parallel to a longitudinal axis of the elevator belt; and

a jacket over the cords, the jacket including a plurality of grooves spaced longitudinally on at least one side of the jacket, the grooves including a fillet near the one side of the jacket, the plurality of cords, the jacket and the elevator belt each having a first longitudinal end that is separate and distinct from a second, opposite longitudinal end.

16. The assembly of claim 15, wherein each fillet has a radius of curvature that is the same.

17. An elevator belt assembly, comprising:

a plurality of cords aligned generally parallel to a longitudinal axis of the belt; and

a jacket over the cords, the jacket including a plurality of grooves spaced longitudinally on at least one side of the jacket, the grooves including a fillet near the one side of the jacket wherein each fillet has a radius of curvature that is between about 0.1 mm and about 0.5 mm.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.